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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,927	01/29/2004	Miho Watanabe	118484	2656

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EXAMINER

THOMAS, JAISON P

ART UNIT	PAPER NUMBER
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1751

DATE MAILED: 04/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/765,927	Applicant(s) WATANABE ET AL.	
	Examiner Jaison P. Thomas	Art Unit 1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/29/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-22, drawn to a resistance element, classified in class 252, subclass 502.
 - II. Claims 23-61, drawn to a method of manufacturing the resistance element, classified in class 427, subclass 101.
 - III. Claim 62, drawn to a thermistor, classified in class 338, subclass 22R.
2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by a different process such as by crosslinking induced by UV radiation as opposed to chemical crosslinking as required by the instant claims and therefore are distinct inventions.
3. Inventions I and III are directed to related products. The related inventions are distinct if the inventions as claimed do not overlap in scope, i.e., are mutually exclusive; the inventions as claimed are not obvious variants; and the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect. See MPEP § 806.05(j). In the instant case, the resistance element does not require a thermistor base nor the claimed temperature dependence of

Art Unit: 1751

the thermistor product and therefore have materially different designs and modes of operation and are distinct inventions.

4. Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

5. During a telephone conversation with Jacob Doughty on 3/27/2006 a provisional election was made without traverse to prosecute the invention I, a resistance element, Claims 1-22. Affirmation of this election must be made by applicant in replying to this Office action. Claims 22-62 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

6. Claim 16 is objected to because of the following informalities: applicant is suggested to change "though" to --through--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1751

It is unclear from the claim whether the cross-linked sites should have the chemical structure from the Markush group in Claim 18 or the Markush group in Claim 2 from which Claim 18 depends. For purposes of examination, Claim 16 will be construed to depend on Claim 1.

9. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is unclear from the claim whether the cross-linked sites should have the chemical structure from the Markush group of Claim 2 upon which Claim 21 depends or the chemical structure as required by Claim 21. For purposes of examination, Claim 16 will be construed to depend on Claim 1.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Fisher et al. (US Patent No. 6,203,814).

Fisher teaches an embodiment of an invention that includes using carbon fibrils which are defined as graphitic nanotubes "functionalized by the chemical substitution or by adsorption of functional moieties" (Column 1, lines 5-9) and forming a network of

Art Unit: 1751

carbon fibrils comprising contacting the functionalized fibrils with a crosslinking agent "effective for producing a network of carbon fibrils. A preferred cross-linking agent is polyol, polyamine or polycarboxylic acid" (Column 7, lines 37-41). Fisher notes that an object of his invention is provide complex structures of fibrils "by linking functional groups on the fibrils with one another by a range of linker chemistries" (Column 4, lines 11-15). Fisher teaches a variety of functionalized nanotubes including nanotubes functionalized with carboxylic acid, as illustrated in Example 12 (Column 15) and with a hydroxyl group, as illustrated in Example 8 (Column 13). Fisher also discloses a generalized structure $[C_nH_L]-R_m$ where C_nH_L represents the carbon nanotube and R_m represents various types of substituents attached to the carbon nanotube. Such substituents can include $-COOR'$ where the R' can be an alkyl, aryl, cycloalkyl, or aralkyl groups (Column 4, lines 25-40).

The reference is anticipatory.

12. Claims 1 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Niu et al. (US Patent Pub. 2003/0086858A1).

Niu teaches methods of oxidizing carbon nanotubes to form nanotubes with modified surfaces that include oxygen containing moieties such as carboxyl and hydroxyl groups (Para. 0046). Further, Niu teaches creation of a network of carbon nanotubes using the surface modified nanotubes discussed above in the presence of a cross-linking agent. The preferred cross-linking agents include polyol or polycarboxylic acid. A specific polyol mentioned includes a diol (Para. 0102). Niu also teaches using a method of curing the oxidized nanotubes in a temperature range of 180 to 450 deg C

Art Unit: 1751

which results in the cross-linking of the oxidized nanotubes (Para. 0103). Niu also discloses a generalized structure $[C_nH_L]-R_m$ where C_nH_L represents the carbon nanotube and R_m represents various types of substituents attached to the carbon nanotube. Such substituents can include $-COOR'$ where the R' can be an alkyl, aryl, heteroaryl, cycloalkyl aralkyl, or heteroaralkyl groups (Paras. 0029-0033). Niu teaches a preferred embodiment of the invention using "multiwalled nanotubes" (Para. 0073).

The reference is anticipatory.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 2-12 and 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niu et al.

Niu is relied upon as discussed above, however, Niu does not explicitly teach the specific cross-link chemical structures, cross-link agents, or the reaction types used to cross-link the functionalized nanotubes.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the linker chemistries, functionalized nanotubes, and the use of various cross-linking agents such as polyol (including diols), polyamine, and polycarboxylic acid of Niu through routine experimentation for best results to achieve

Art Unit: 1751

the limitations of the instant Claims 2-12. As to optimization results, a patent will not be granted based upon the optimization of result effective variables when the optimization is obtained through routine experimentation unless there is a showing of unexpected results which properly rebuts the prima facie case of obviousness. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). See also *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990), and *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

It would have been further obvious to one of ordinary skill in the art at the time the invention was made to react the functionalized nanotubes together without the presence of a cross-linking agent as the Niu teaches the benefit of varying the sizes of interstitial spaces in the carbon nanotube network by adjusting "... the concentration and level of dispersion of nanotubes..." in order to achieve tailored networks (Para. 0107) and meet the limitations of instant Claim 16. Further, examiner respectfully submits the use of the various reactions used to cross-link the functionalized nanotubes detailed in instant Claims 17 and 19 are notoriously well known in the art and does not patentably distinguish over the prior art of record. In regards to Claims 18, 20 and 21, Niu discloses a variety of functionalized nanotubes as taught above and that reaction of the disclosed structures with each other would inherently yield the chemical structures as required by Claim 18 and 21.

15. Claims 3-21 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Niu et al.

Niu teaches the resulting cross-linked carbon nanotube structure as required by instant claims 1 and 2 from which claims 3-21 depend therefore the reference is anticipatory.

In the alternative, with regards to the obviousness of the product-by-process claims, "even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). "The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Double Patenting

16. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory

Art Unit: 1751

obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 1, 18, and 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 2, and 15 respectively of copending Application No. 10/768039. Although the conflicting claims are not identical, they are not patentably distinct from each other because in instant Claim 1 and copending application Claim 1, claims are directed towards a carbon nanotube structure having a mesh structure where plural carbon nanotubes are cross-linked to one another through cross-linked sites. In instant Claim 18 and copending application Claim 2, both claims are directed to each of the cross-linked sites having at least one chemical structure selected from the following group --COOCO--, --O--, --NHCO--, --COO--, and --NCH--. In instant Claim 22 and copending application Claim 15 both claims are directed towards a cross-linked carbon nanotube structure wherein in each of the plural carbon nanotubes is a multi-wall carbon nanotube.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

18. Claim 1, 2, 22 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1, 5, 9 of copending Application No. 10/935174. Although the conflicting claims are not identical, they are not patentably distinct from each other because both instant Claim 1 and copending application Claim 1 are directed to a resistance element comprised of a nanotube structure having a mesh structure in which the nanotubes are cross-linked to one another through cross-linked sites. In instant Claim 2 and copending application Claim 5, both claims are directed to chemical cross-link sites where each of the cross-linked sites requires the chemical structure as illustrated in the instant Claim 2. In instant Claim 22 and copending application Claim 9, both claims are directed to electrical elements as defined in instant Claim 1 wherein the nanotubes used are multi-wall nanotubes.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

19. Claim 3 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 11 of copending Application No. 10/537745. Although the conflicting claims are not identical, they are not patentably distinct from each other because both the instant claim and copending application claim are directed to carbon nanotubes each having a functional group and a crosslinking agent capable of prompting a crosslinking reactions with the functional group wherein

Art Unit: 1751

the crosslinking agent is supplied and the nanotubes are cross-linked to each other through a reaction between the cross-linking agent and functionalized nanotubes via a curing process.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The references are considered cumulative to or less material than those discussed above.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jaison P. Thomas whose telephone number is (571) 272-8917. The examiner can normally be reached on Mon-Fri 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on (571) 272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

Art Unit: 1751

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JT

Jaison Thomas
Examiner
4/3/2006

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